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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/806,727	03/22/2004	Yiping Hu	H0006977--1060	2613

128 7590 10/20/2004

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EXAMINER

TUROC, DAVID P

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 10/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/806,727

Applicant(s)

HU ET AL.

Examiner

David Turocy

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 9/16/2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 13-23 is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Applicant's amendments filed June 23, 2004 have been fully considered. In light of the amendments, the rejections made under 35 USC 112, 102, and 103 have been withdrawn by the examiner.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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4. Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 6491208 by James et al ("James") in view of US Patent 6049978 by Arnold ("Arnold").

Claim 1: James teaches a method of repairing a turbine component by cold spraying powder material to build up degraded areas on the turbine component (abstract). Cold spraying is taught to be a process of spraying coating particles at supersonic speed such that their kinetic energy is converted to plastic deformation of the particles upon impact. This process forms a dense coating, which is mechanically adhered to the substrate (col. 4). What James fails to teach is the post-treatment steps of Applicant.

Arnold teaches a method of repairing turbine blade parts by coating with a high-density coating process involving supersonic spraying of coating particles that form a dense coating which is mechanically adhered to the substrate (abstract; col. 3), similar to the method of James. While the coating of Arnold is dense, like James, in fact having a porosity of only about 0.5% (col. 9, line 38), Arnold teaches that the mechanical adhesion of the coating is not sufficient without post-treatment steps which further densify the coating and convert the mechanical adhesion of the repair coating to a metallurgical/diffusion bond (col.s 3-4; col. 9, line 47). Arnold also teaches of the advantage of converting the mechanical adhesion to a metallurgical/diffusion bond is to eliminate the interface boundary, which is usually the site of failure (Column 9, line 49-50).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to modify James to use the post spray thermal treatment as

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suggested by Arnold to provide a denser, well-bonded coating to repair a turbine because James and Arnold both teach supersonic spraying of coating particles to form a dense, mechanically adhered repair coating on turbine blades and Arnold teaches the use of post-treatment steps to further densify the mechanically adhered coating and enhance its adhesion to the substrate. Please note that the test of obviousness is not an express suggestion of the claimed invention in any or all references, but rather what the references taken collectively would suggest to those of ordinary skill in the art presumed to be familiar with them (*In re Rosselet*, 146 USPQ 183).

Claims 2-6: James teaches a method of repairing a turbine component by cold spraying powder material to build up degraded areas on the turbine component (abstract). James specifically teaches exemplary repair of a turbine blade tip, as required by claims 2-3. James also teaches that part of the repair process is disassembling the turbine to provide access to a part having an area to be repaired (col. 2, line 58). One example he provides is repair of a tip, however he fails to specifically teach repair of a leading edge, platform, or z-notch shroud part of a turbine blade.

However, the turbine blade of James will have a leading edge, platform, and z-notch shroud. Since the repair of the tip of said blade is merely exemplary and since James teaches disassembly to provide access to an area to be repaired, it would have been obvious to one of ordinary skill in the art to repair any area of the blade in need of repair by the method of James.

Claims 7-10: Applicant requires various species of post-treatment, disclosed separately. Arnold teaches, as post-treatment, the use of a sintering heat treatment and hot isostatic pressing (see Figure 1(a)). Sintering is inclusive of vacuum sintering, particularly in light of the use of sintering to remove porosity, which would be aided, by the use of a vacuum.

Arnold teaches sintering heat treatment at 2150 degrees F, for about 2 hours (col. 7, line 63), lying within ranges claimed by Applicant in claim 8. Arnold teaches hot isostatic pressing (HIP) at about 2200 F in about 15 KSI argon for about 4 hours, lying within the ranges claimed by Applicant in claim 10.

Claim 11: Arnold teaches cooling after isostatic pressing (col. 20, line 57), as required by claim 11, however, Arnold fails to teach the cooling rate. It is examiner's position that selection of a cooling rate would have been obvious to an ordinary artisan because the cooling rate is known to effect properties in metal agents. Selection of a cooling rate would have been within the ordinary skill of an artisan depending on the metallurgical properties of the substrate and coating materials and the desired time frame for completion of the coating operation.

It is well settled that determination of optimum values of cause effective variables such as these process parameters is within the skill of one practicing in the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980).

Claim 12: Arnold teaches sintering heat treatment and hot isostatic pressing, as outlined above, both of which qualify as heat-treatment. While the sintering heat treatment meets the limitations of the first heat treatment step of claim 12, Arnold fails to teach the temperature and time ranges of the second claimed heat treatment step. However, as outlined above, one of ordinary skill in the art would have been capable of optimizing a cause-effective variable such as time or temperature depending on the properties of the substrate and coating and the desired timeframe for completion of the coating operation.

Allowable Subject Matter

5. Claims 13-23 are allowed.
6. The following is an examiner's statement of reasons for allowance: None of the prior art cited or reviewed by the examiner teaches or fairly suggests a cold gas spray of a turbine, followed by a vacuum sinter, a hot isostatic pressure and then a separate heat treatment. The prior art only suggests a thermal post treatment.

Response to Arguments

7. Applicant's arguments filed June 23, 2004 have been fully considered but they are not persuasive. In light of the amendments the rejections made under 35 USC 112,102, and 103 have been withdrawn by the examiner.
8. The applicant has argued against the Arnold reference, stating that it is directed to a High Velocity Oxygen Fuel (HVOF) coating and not to a cold gas dynamic spray coating. The examiner respectfully disagrees. While Arnold does

not teach of a cold gas dynamic spray coating, he does however teach of a high density coating process used to coat and repair a turbine and uses HVOF as an example of such a high energy coating process (Abstract). Both Arnold and James teach of using thermal spray process to provide a high density mechanically adhered coating to repair turbine parts. Since Arnold and James are both concerned with repairing coatings on turbine lades and both use spraying for the application of the repair material, the two patents would constitute analogous art. Arnold teaches that by converting the mechanically adhered coating to a diffusion bond coating, by a post-spray thermal treatment, provides no interface boundary, which is usually the site of failure. Therefore, it is the examiners position that the method is not patentable over the combination of James and Arnold, even though Arnold does not suggest a post-spray treatment on a cold gas dynamic spray.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory

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period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Turocy whose telephone number is (571) 272-2940. The examiner can normally be reached on Monday-Friday 8:30-6:00, No 2nd Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (571) 272-1415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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